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SARY-SHAGAN MISSILE TEST CENTER TELECOMMUNICATIONS USSR

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ABSTRACT

1. This report is a summary of all communications systems--both operational and support and both internal and external to the range--which serve the Sary-Shagan Missile Test Center.

2. The facilities which make up these communications systems are described in the text and graphically portrayed on three maps and six annotated photographs. The information in this report is current through November 1970.

INTRODUCTION

3. Sary-Shagan Missile Test Center (SSMTC) is the largest and most instrumented research and development range for Soviet defensive missile systems. In addition, impact areas for the Kapustin Yar/Vladimirovka Missile Test Center are located at Sary-Shagan. Sary-Shagan MTC is located on the western shore of Lake Balkhash, 340 nautical miles (nm) northeast of Tashkent, in south-central Soviet Kazakhstan. The range extends 300 nm east-west and 150 nm north-south.

4. Several systems of internal and external range communications exist at SSMTC. These systems include high-frequency rhombic and fishbone antennas for long distance external communications, high-frequency dipole antennas for long distance internal communications, microwave horns and possible VHF yagis for extended line-of-sight internal communications links, and open wire and buried cable lines for internal, local, and possible long distance communications.

BASIC DESCRIPTION

Radio Communications

5. High-frequency and microwave links have been identified at the Sary-Shagan Missile Test Center. The high-frequency communications system consists of three main facilities (communications facilities 1, 2, and 3), 13 individual horizontal dipole antennas at isolated locations throughout the range, and a day/night pair of rhombic antennas at the ESV tracking facility (Figure 1).These high-frequency communications facilities provide for intrarange communications and for communications with Moscow and the Kapustin Yar/Vladimirovka Missile Test Center. Sary-Shagan links are depicted graphically on Figure 1. A detailed report on the system has been published.[1] In addition, possible VHF yagi antennas have been identified at seven microwave facilities. No other very high-frequency systems have been identified.

Primary High-Frequency Facilities

6. The primary high-frequency communications facilities at Sary-Shagan Missile Test Center include one transmitting and two receiving facilities. Communications

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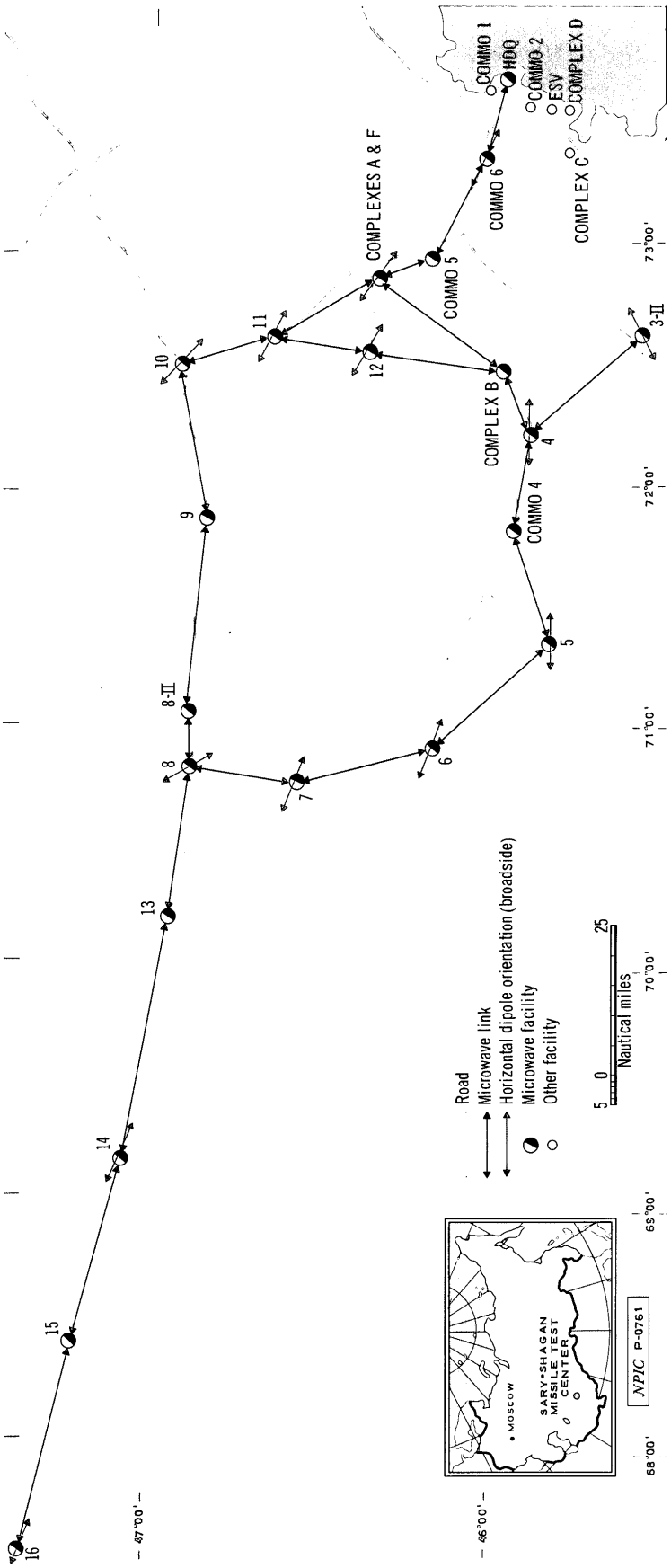

FIGURE 1. MICROWAVE LINKS AND HORIZONTAL DIPOLE ORIENTATIONS AT SARY-SHAGAN MISSILE TEST CENTER, USSR

facilities 1 and 2, transmitting and receiving installations, respectively, provide long distance external and intrarange communications for the test center. Their rhombic antennas are oriented toward Moscow and the Kapustin Yar/Vladimirovka Missile Test Center. Although both facilities have numerous horizontal dipole antennas which provide communications with facilities throughout the Sary-Shagan range, communications facility 1 is probably the main correspondent for 11 of the 13 downrange horizontal dipole antennas (Table 1). This facility has the greater number of horizontal dipole antennas, all of which have a downrange forward azimuth.

7. Communications facility 3, a receiving installation, contains two fishbone antennas. The forward azimuth of these antennas is toward the Kapustin Yar/Vladimirovka Missile Test Center. Their back azimuth is directed toward the Sary-Shagan rangehead. A single horizontal dipole antenna, directly associated with this facility, is located to the north. The azimuths of the antenna are 100 and 280 degrees 25X1 One azimuth is toward communications facilities 1 and 2. In addition, 25X1 communications facility 3 is the correspondent for two of the downrange horizontal dipole antennas (Table 1).

8. A complete description of communications facilities 1, 2, and 3 (including line drawings and detailed mensuration) is provided in a previous NPIC report.[2] No significant changes have been noted at the primary facilities since that report was published.

Other High-Frequency Facilities

9. Horizontal dipole antennas (Figure 2) have been identified at 13 other range facilities (eight tracking facilities, three microwave facilities, electronics facility D at launch complex A, and communications facility 6). Broadside azimuths and probable correspondents for these antennas are provided in Table 1.

10. A day/night pair of rhombic antennas is located at the ESV tracking facility. The correspondent of the forward azimuth of the antennas is Moscow. No high-frequency communications link between the ESV tracking facility and another facility at SSMTC can be identified. Communications facility 2 is in close proximity to the ESV tracking facility, however, and the two facilities are connected by an underground telephone cable (Figures 6 and 8). 25X1

Table 1. Isolated Horizontal Dipole Antennas, SSMTC

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Facility		Prob Correspondent
Tracking Facility 16		Commo Fac 1
Tracking Facility 14		Commo Fac 1
Tracking Facility 12		Commo Fac 1
Tracking Facility 11		Commo Fac 1
Microwave Facility 10		Commo Fac 1
Tracking Facility 8		Commo Fac 3
Tracking Facility 7		Commo Fac 1
Microwave Facility 6		Commo Fac 3
Tracking Facility 5		Commo Fac 1
Tracking Facility 4		Commo Fac 1
Microwave Facility 3-II		Commo Fac 1
Commo Facility 6		Commo Fac 1
Launch Complex A		Commo Fac 1

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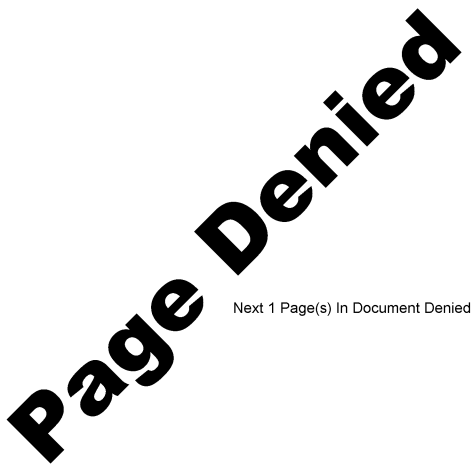

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Very High-Frequency Facilities

11. A possible VHF yagi communications antenna has been identified at microwave facilities with guyed towers (Figure 3). The possible antenna is mounted on top of the microwave tower on a single 9-meter (30-foot) vertical mast. The horizontal boom 25X1
Two support braces join the mast and boom. A possible yagi antenna 25X1
has been identified at seven microwave facilities and is apparently at all facilities with guyed towers.

12. The possible yagi antenna at microwave facility 13 has broadside azimuths of 130 and 310 degrees The microwave horns at this facility have an orientation of 25X1
The broadside azimuths of the possible yagi at microwave facility 16 are 25X1
approximately 145 and 325 degrees. The single microwave horn at this facility has an azimuth of 100 degrees.

13. No R-401 (Mercury Grass) antennas, R-400 microwave dishes, or R-122 (Fork Rest) antennas were identified at the test center.

Telephone Communications

14. Land telephone communications identified at the Sary-Shagan MTC are of both the overhead open wire or cable and underground cable type. Wherever possible, telecommunications lines were differentiated from powerlines by observable physical characteristics (Figure 5). This direct identification was supplemented wherever possible by association with facilities of known function. For example, an overhead line terminating at the telephone exchange probably serves a telecommunications function, while a line that terminates at a substation is probably a powerline.

15. The confidence of identification varies directly with the number of observable physical characteristics and associated facilities of known communications function. In general, confidence of identification is higher in the relatively highly developed lakefront area and is lower downrange where rudimentary facilities and poles supporting single cables are prevalent (Figure 4).

16. Identification by association often aids direct identification. Line routing relative to other identifiable lines, communications buildings, telephone exchanges, power substations, and other utilities is often a determining factor. The construction sequence of communication lines also aids in identification.

External Communications

17. A review of KEYHOLE imagery confirms that there is no direct land telephone communications between the western end of the range and the town of Dzhezkazgan (Figure 4). Although large-scale photography of the area north of the town of Sary-Shagan is limited, the test center apparently is linked to both Mointy and Balkhash by the communications lines shown in Figure 4. At least one overhead line parallels the railway which connects Mointy and Chu via Sary-Shagan. This line may be a regional trunk telephone line or part of the railway communications system.

Sary-Shagan MTC Telephone Exchange

18. The telephone exchange for the test center is located at the range headquarters area. Figure 5 shows the telephone exchange building and numerous telephone lines leading from it. Inset photographs compare a typical telephone pole to a high-voltage power pole.

Lakefront Communications

19. Land telephone communications in the lakefront area are delineated in Figure 6. Most of the lines leading south from the headquarters complex are underground, whereas

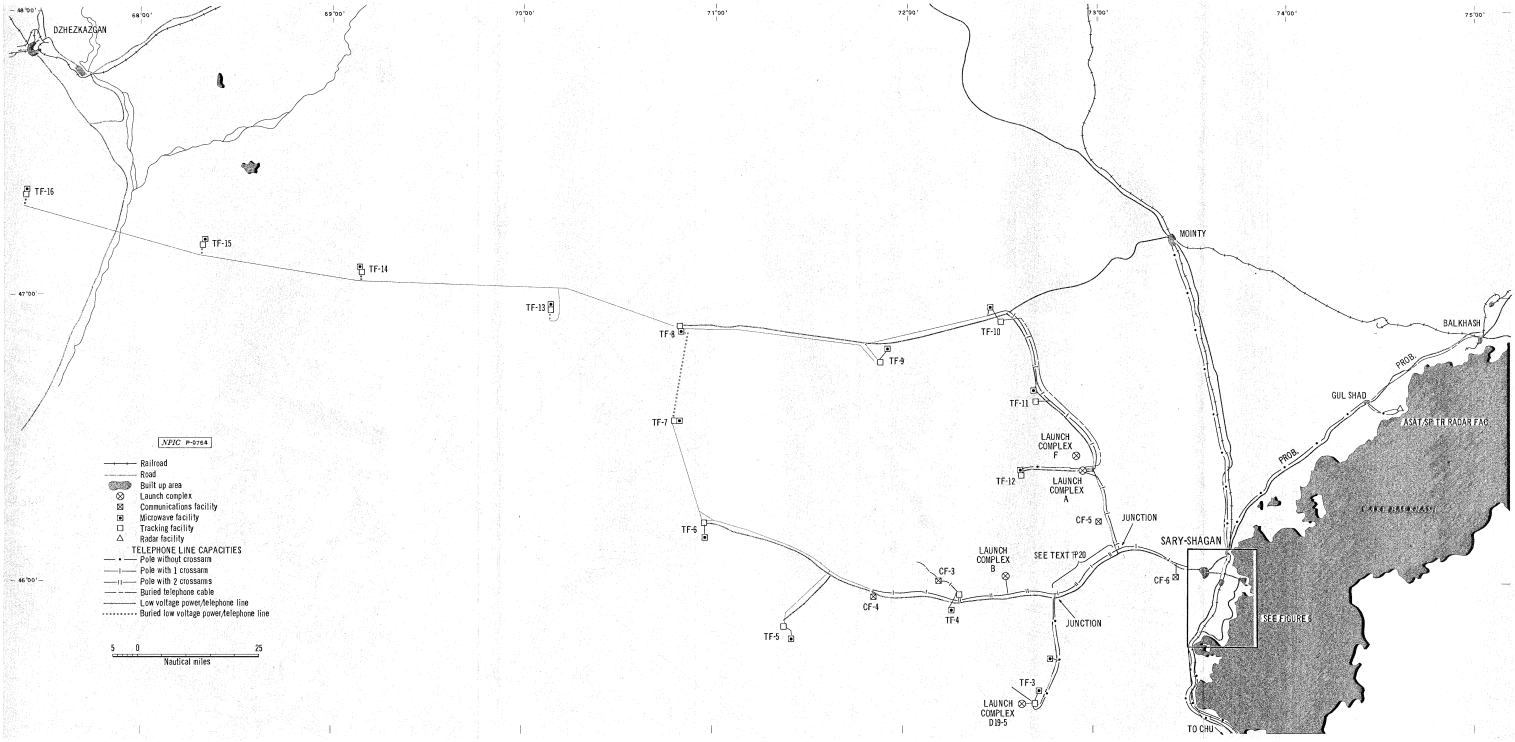

FIGURE 4. DOWNRANGE AND EXTERNAL MAND TELEPHONE COMMUNICATIONS, SSMTC. Lack of characteristic physical features and absence of high-resolution photography of the lines connecting downrange facilities make it impossible to differentiate low-voltage powerlines from telephone lines west of tracking facility 10 and communications facility 4.

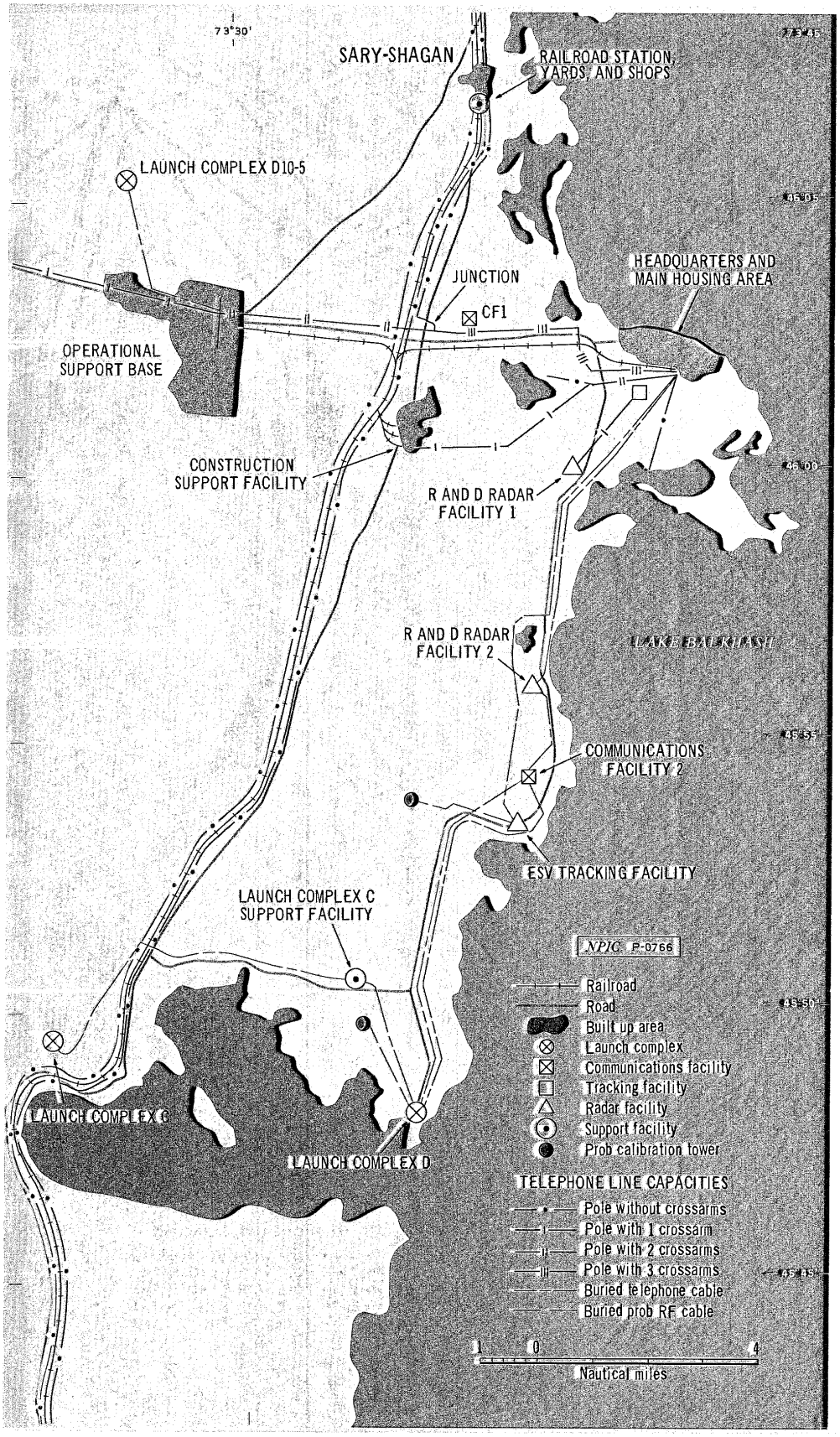

FIGURE 6. LAKEFRONT TELEPHONE COMMUNICATIONS, SSMTC

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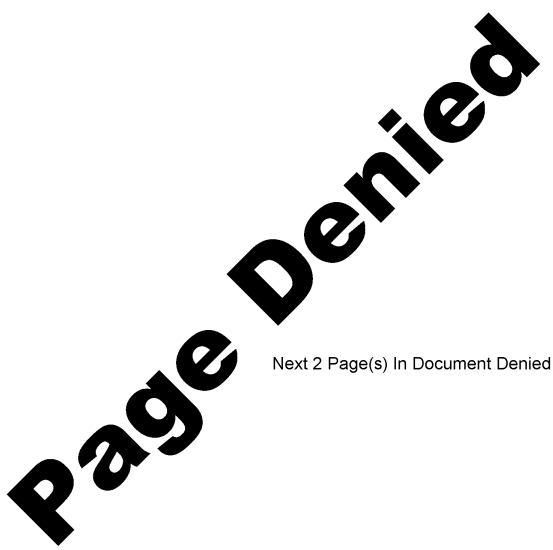

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the main trunk line leading downrange (west), through the operational support base, is overhead. The major junction between this line and the overhead line leading north to the railroad station, yards, and shops and the town of Sary-Shagan is a critical point in the landline communications system (Figure 6 and 7). All external landline communications are tied to the Sary-Shagan telecommunications system at this point. Both Molniya buildings are cable connected to a probable calibration tower 3,000 meters (10,000 feet) west of the ESV tracking facility. A similar tower is cable connected to launch complex D.

Downrange Communications

20. The main telephone line leading downrange out of the operational support base feeds two other primary lines (Figure 4). The first junction is with a line serving launch complexes A and F and other facilities to the north. The second junction is with a line leading south to launch complex D19-5 and tracking facility 3. It could not be determined whether the telephone poles of the main trunk line between these two junctions have one or two crossarms. Telephone lines have been traced as far as tracking facilities 4 and 10. Beyond these facilities a single powerline extends downrange. It is undetermined whether or not the poles for this powerline also carry a telephone cable.

21. Telephone communications at launch complexes A, F, and B04-5 are delineated on Figure 9. An underground data link system connects the B04-5 tracking and guidance facility, the B04-5 air warning radar facility, and electronics site C (launch complex F). Tracking facility 10 is apparently tied to this system via an underground telephone cable. A detailed description and line drawings of all utilities at launch complex B are given in a previous NPIC report.[3]

22. No telephone cable markers or repeater stations (buried, aboveground, manned, or unmanned) have been identified at Sary-Shagan Missile Test Center.

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3. NPIC. [redacted] 66, *Launch Complex B, Sary-Shagan Antimissile Test Center, USSR,* Dec 66 (TOP SECRET CHESS RUFF CODEWORD [redacted] 25X1 25X1

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MAPS OR CHARTS

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REQUIREMENT

NPIC/IEG/MSD/DMB Project 250841
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